

30 July 1963

MEMORANDUM FOR: Chairman, Technical Development Committee

THROUGH : Executive Secretary, TDC

SUBJECT : Staff Study - [] Versatile, High Precision Stereoscopic Viewer, Proposal #552A STATINTL

1. PROBLEM:

In recent weeks considerable attention has been centered on the problem of low contrast resolution. The nominal ratio of densities for low contrast has been arbitrarily set at 2:1. The contrast in the typical bar type resolution target is approximately 1000:1. The fact that resolving power of optical systems is reduced if contrast is reduced has become a matter of fundamental significance. This relationship is termed the Sine-Wave Response or the Modulation Transfer Function of the system. It is difficult to predict the relationship of the resolution of a complex system to high-contrast and low-contrast images; however, it is known that the highest frequency information on a typical aerial photograph will necessarily be recorded at very low modulation (contrast). There is firm evidence that acquisition systems of the immediate future will produce photography having 200 l/mm low contrast imagery. Exploitation equipment which can present such information in a form that is perceptible to a P.I. is practically non-existent. Two main lines of development which are being pursued with the intention of overcoming this deficiency are the development of a Coherent Light Enlarger by [] and the utilization of high-performance laboratory microscopes by [] development is characterized by a number of unknowns which indicate a considerable time delay before the first prototype will be delivered. The [] development should provide the optics needed to replace the Zoom 70. Assuming this to be the case, development of suitable light sources and mechanical support will be required.

2. FACTS:

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a. Recently P.I.'s assigned to PAG viewed TKH materials on a versatile, roll-film stereoviewer developed by [] for the Bureau of Naval Weapons. The equipment is currently in use for detailed analysis of TKH materials at UKNPIC. The users are enthusiastic about the device. The PAG P.I.'s were also impressed. A significant confirmation of intelligence was achieved through its use, which was not available with the Zoom 70 or the M-5. Implications are that an information loss is already being experienced.

b. On the basis of this favorable impression, P.I.'s from FID were asked to evaluate the instrument. Their impression was likewise favorable.

DECLASS REVIEW by NIMA/DOD

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c. A Point Transfer Device, which is presently under contract to FDS for development by [] employs an expanded version of the viewing system on the Navy viewer. Actual development required for the Point Transfer Device will be primarily in the point marking system since the basic concepts of the viewing system are already proven.

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d. On the basis of the suitability of the Navy viewer, [] was invited to propose a similar viewer having the expanded functions of the viewing system on the Point Transfer Device. This proposal has been received and is designated 552A. The main characteristics of this instrument are:

- New Viewer*
- (1) Size: approximately that of a double pedestal desk
 - (2) Magnification: 1.5X - 135X in four steps with overlapping zoom
 - (3) Resolution: at 1.5X, 12 lines/mm - at 135X, 600 lines/mm
(high contrast)
 - (4) Field of View: 36°; at 1.5X, 4.2 inches
36°; at 135X, .048 inches
 - (5) Optical Accommodations: Independent zoom, 360° rotation, image reversal, eye station cross-over
 - (6) Scanning Control: Joystick actuated - independently variable direction and velocity rates to conform to optical settings for each station.
 - (7) Film Handling: One or two rolls 70mm - 9½", manually operated film transport, automatic interstereo loop, 0-16 feet, vacuum hold down.
 - (8) Cost: approx [] delivery 8 months

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STATINTL e. For purposes of comparison the characteristics of the original Navy viewer, now designated [] Model 387 StereoViewer, are listed below:

- Navy Viewer*
- (1) Size: ~~Same as 552A~~
 - (2) Magnification: 5X - 50X in two steps with overlapping zoom
 - (3) Resolution: at 5X, 40 lines/mm - at 50X, 400 lines/mm
(high contrast)
 - (4) Field of View: 12°; at 5X, .42 inches
12°; at 50X, .04 inches

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- (5) Optical Accommodations: independent zoom, 360° rotation.
- (6) Scanning Control: Joystick actuated - no independent variation in direction or velocity
- (7) Film Handling: One roll only 70mm - 9½', manually-operated film transport, automatic interstereo loop, 0-16 feet, glass plate hold down.
- (8) Cost: approx 92K; delivery, 6 months

f. The basic versatility and performance of this system is established by the Navy viewer which has been thoroughly evaluated and in constant use for the past six months.

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g. The modified version as described in the [] proposal, 552A does not require major changes in design. The purpose of the modifications is to increase versatility and performance to conform to anticipated requirements, without exceeding the state-of-the-art.

h. No competitive stereoscopic roll film viewer is known to exist or to be under development.

3. CONCLUSIONS:

a. The need for several instruments of this type which will assure the P.I. that he is seeing all the information on the photography, without requiring special processing or cutting is now apparent and will doubtless become acute.

b. Roll film viewing capability must be maintained regardless of the status of the chip system.

c. The performance and operational suitability of the system has been thoroughly confirmed.

d. Performance and versatility requirements inherent in new acquisition systems indicate that the modified version is required.

e. The device described in proposal 552A, called the Versatile, High Precision Stereoscopic Viewer, will provide a means for intense stereoscopic analysis on roll film for all the stereoscopic photo-acquisition systems that are known or anticipated in the foreseeable future.

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4. RECOMMENDATIONS:

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a. That NPIC purchase, under an [], fixed price contract, two of the viewers as described in [] proposal 552A, at a cost of [] each and a total cost of []. The first of these to be delivered within eight months of the contract date, and the second to be delivered within nine and one-half months of the contract date. The first viewer will be designated for the PAC, the second for the PID.

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b. Or that, NPIC purchase under an [], fixed price contract, one of these viewers at a cost of [] to be delivered to the PAC within eight months of the contract date.

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Development Branch, F&DS